### REVISED TECHNICAL MEMORANDUM

Preliminary Remediation Goals (PRGs) and Applicable or Relevant and Appropriate Requirements (ARARs)

Waukegan Manufactured Gas and Coke Plant Site

September 4, 1992

Prepared for North Shore Gas Company

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#### TECHNICAL MEMORANDUM

## PRELIMINARY REMEDIATION GOALS (PRGs) AND APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

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#### TECHNICAL MEMORANDUM

## PRELIMINARY REMEDIATION GOALS (PRGs) AND APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

#### 1.0 INTRODUCTION

This technical memorandum discusses preliminary remediation objectives for the Waukegan Manufactured Gas and Coke Plant (WCP) site, identifies potential ARARs, and discusses PRGs for addressing contamination at the site. The preliminary identification of ARARs and the development of PRGs is based on the current understanding of site conditions (summarized below) and the preliminary identification of remedial alternatives presented in the July 1991 Work Plan.

The ARAR and risk assessment issues summarized in this technical memorandum are submitted for United States Environmental Protection Agency (U.S. EPA) review and approval. This technical memorandum has been revised from the July 1991 draft version based on U.S. EPA comments and the results of the Phase I investigation (Barr, 1992). U.S. EPA comments on this revised document will be considered before the Phase II investigation begins. This process has been designed to provide a basis for interaction between: (1) the remedial investigation data collection activities directed by North Shore Gas Company and General Motors; and (2) the risk assessment activities directed by the U.S. EPA.

#### 2.0 PRELIMINARY REMEDIATION OBJECTIVES

As defined in the National Contingency Plan (NCP), remediation objectives are established to provide a general description of what the remedial action is intended to accomplish. The remedial objectives are based on the understanding of site conditions and risks derived from the remedial investigation and the baseline risk assessment. At this stage in the RI/FS process, the remedial objectives presented are preliminary.

Remedial action objectives include general and site-specific objectives. General remedial action objectives are defined by the National Contingency Plan (NCP) and CERCLA (as amended by SARA) and are applicable to all Superfund sites.

These objectives relate to the statutory requirements for development of the remedy. Site-specific remedial objectives relate to specific contaminated media, potential exposure routes, and exposure parameters. They are intended to identify target remediation areas and remediation goals. Remedial action objectives are presented in Section 2.2. Preliminary remediation objectives are discussed below to: (1) establish a framework for beginning consideration of potential remedial actions designed to meet remediation goals; and (2) provide the U.S. EPA and IEPA with information about the conceptual model used to develop the approach to site investigation.

SARA requires that remedial actions must comply with ARARs under federal and state environmental laws or facility siting laws or must provide grounds for seeking a waiver of the requirement. In addition to ARARs, remedial actions may consider, as appropriate, other advisories, criteria, or guidelines. Potential ARARs are presented in Section 3.5.

Remediation goals are medium-specific or operable unit specific chemical concentrations that are protective of human health and the environment and serve as goals for the remedial action. Preliminary remediation goals are an early screening tool and are developed early in the RI/FS process based on ARARs and other information such as concentrations associated with a cancer risk level. PRGs are revised as information on the site is developed. The NCP (U.S. EPA 1990) and EPA guidance (U.S. EPA 1991b) indicate that PRGs are to be modified based on the results of the baseline risk assessment.

The preliminary remediation objectives developed in this section are used in conjunction with potential ARARS (Section 3) to establish PRGs (Section 4). Early consideration of these issues will help coordinate completion of the interactive investigation/risk assessment activities.

As the site investigation proceeds, information about the nature and extent of potential contamination will be used to quantify associated potential risks to human health and the environment. The quantified risks will be considered in the feasibility study for developing site-specific goals for the remedial measures being evaluated. The following discussions are based on the current

understanding of site conditions and will be re-evaluated as the investigation progresses.

#### 2.1 Conceptual Site Model

The following conceptual model of site conditions has been developed to provide a rational framework for establishing preliminary remediation objectives for the WCP site.

#### 2.1.1 Sources

As described in the July 1991 Work Plan, two potential sources of contamination have been identified at the WCP site. The first is a former railroad tie and wood treating plant located on the west side of the site. The second is the manufactured gas/coke plant formerly present on the eastern portion of the site.

Creosote was used as wood preservative at the former railroad tie and wood treating plant. Waste disposal and other operating practices at the former plant are not clear. Drippings from treated ties, spillage during processing, leaks and spillage from creosote storage or transfer areas, and disposal of process wastes are potential sources of contamination. The presence of oil in the soil and moderate to heavy oil sheens were observed on soil samples from the vicinity of the former wood treating plant (Barr, 1992). There are no currently visible structures associated with this operation on-site.

The operating practices of manufactured gas/coking facilities included collection and sale of by-products such as tar and ammonia. Gas was purified on-site using a Thylox process. The disposition of Thylox and other manufactured gas/coking wastes is not known. MGP/coking residuals may include tars, tarry and/or oily soils, purifier residuals, and groundwater containing associated chemical constituents. The presence of tar and oil in the soil and moderate to heavy oil sheens were observed on soil samples collected from areas in the vicinity of the former MGP/coking facilities in the Phase I investigation; moderate oil sheens were also observed on samples from an area in the northeast portion of the site (Barr, 1992). With the exception of a

building being used by OMC and a few at-grade structures or foundations, no above-ground structures from the manufactured gas/coking facility remain at the site.

#### 2.1.2 Key Contaminants

Waste types that may have resulted in chemical constituents identified in the Phase I RI include creosote, coal tar, and Thylox wastes. These wastes may contain hundreds of different individual compounds. Based on toxicities and regulatory standards, four categories of key constituents have been identified as being most significant for the investigation and remediation of the WCP site. These categories are described below:

- Polycyclic Aromatic Hydrocarbons (PAHs) -- PAHs are organic compounds that are primary components of both creosote and coal tar. These compounds contain two or more benzene ring structures. Individual PAHs vary in toxicity, and seven PAH compounds have been identified by the U.S. EPA as probable human carcinogens.
- Phenolic Compounds -- Phenolic compounds are organic compounds associated with creosote and coal tar. Phenols are comprised of a single benzene ring structure with one or more attached hydroxyl groups. Phenolic compounds as a class are generally less toxic than PAHs, and have not been identified as known or suspected human carcinogens by the U.S. EPA.
- Volatile Organic Compounds -- Volatile organic compounds associated with creosote and/or coal tar wastes include the following aromatic compounds: benzene, ethylbenzene, toluene, and xylenes (BETX). These aromatic compounds are comprised of a single benzene ring with or without attached methyl groups. Benzene is classified as a known human carcinogen by the U.S. EPA. The other three have not been identified as known or suspected human carcinogens by the U.S. EPA.
- Metals and Inorganics -- The most significant of the metals and inorganic compounds likely to be associated with manufactured

gas/coking processes are arsenic and cyanide compounds (thiocyanates). These constituents may be associated with wastes from the Thylox gas purification process formerly used at the WCP site. The toxicities of these constituents vary depending upon the particular chemical form that may be present at the site.

Data collected during Phase I of the remedial investigation (Barr, 1992) have been reviewed to assess specific chemical constituents associated with the above categories and to identify possible additional chemicals of concern. The review was also used to determine if all the chemicals listed in the July 1991 draft discussion of PRGs are, in fact, likely to be addressed during remediation. Based on this review, potential ARAR identification led to the development of preliminary remediation goals for the following chemicals:

- Benzene
- Ethylbenzene
- Toluene
- Xylenes
- Carcinogenic PAHs (see Table 1)
- Noncarcinogenic PAHs (see Table 1)
- Phenols
- Arsenic
- Cyanide
- Cadmium
- Selenium
- Mercury

Specific preliminary remediation goals were developed for certain specific PAHs, but not for noncarcinogenic PAHs as a group. Nevertheless, the suite of noncarcinogenic PAHs in Table 1 is carried through in subsequent chemical specific evaluations because of their association with creosote and MGP/coking tars.

#### 2.1.3 Contaminant Migration

Potential contaminant migration pathways at the WCP site will depend on the locations of the waste and contaminated media. Shallow groundwater at the site is believed to move through the sand unit and discharge to surface waters. Phase I groundwater elevation data indicate the discharge is predominantly to Waukegan Harbor. Deeper groundwater reportedly shows upward gradients, based on regional information, and is isolated from shallow groundwater by the presence of a till unit extending from depths of approximately 25 to 30 feet below the ground surface to depths of approximately 65 to 110 feet below the ground surface.

The potential contaminant migration mechanisms for the site include:

- Movement of tars downward to the sand/till contact and subsequent horizontal movement controlled primarily by the slope of the till;
- Leaching by infiltrating water of contaminants from source materials above the water table and leachate migration to the groundwater;
- Leaching by groundwater of contaminants from tars and tar-saturated soil present below the water table;
- Movement of dissolved phase constituents with groundwater and discharge to surface waters;
- Release of fugitive dust to ambient air through wind-driven and mechanical erosion (including disturbance/development) if contaminants are present in surface soil; and
- Volatilization and upward diffusion of constituents from the unsaturated zone to the ambient air.

The movement of specific constituents will be a function of their physical and chemical properties. Of the identified key contaminants, the volatile organics, phenolics, and lower molecular weight PAHs (e.g., naphthalene and

acenaphthene) are most mobile in a soil-groundwater matrix and may be released to groundwater. The volatile organics and lower molecular weight PAHs are most mobile in a soil-air matrix and may be capable of volatilization and diffusion to the ambient air. The higher molecular weight PAHs and metals are more likely to remain bound to a soil matrix and have limited mobility.

#### 2.1.4 Land Use Factors and Potentially Exposed Populations

Consideration of current and potential land use at the WCP site will affect the potential for and degree of exposure to contaminants contained in various media. As stated in the NCP (page 8710), "the likelihood of [an] exposure actively occurring should be considered when deciding the appropriate level of remediation." The following discussion of existing land use factors and controls provides a basis for evaluating the potential for various exposures to occur.

Land use in the area surrounding the WCP site is predominantly industrial, recreational, and commercial. Land use at the WCP site is commercial marine, industrial, and vacant land; recent uses include special event parking, boat storage, and miscellaneous storage. The City of Waukegan Zoning Ordinance (1987) identifies the southern portion of the site as being zoned for industrial use (General Industrial District I2, "relatively remote from residential and business development") and the northern portion of the site as being zoned for commercial development to support marine recreational use (Marine-Commercial Recreational District M-CR, "for commercial marina and lake-oriented activities"). Residential development is not a permitted land use for these zoning classifications.

The 1987 Comprehensive Land Use Plan for the City of Waukegan states that the City's goals and policies are for future industrial use of the site. If residences are to be developed along the harbor, the 1987 Comprehensive Plan indicates that it would likely occur in an area designated as "Harbor Mixed Use", located approximately 1 mile south-southwest of the site. A boat launch facility, formerly under consideration by the Waukegan Port District (now canceled), is a type of use appropriate to the site zoning and the site designation in the comprehensive plan. The commercial marine facility is

expected to expand their operation around Slip No. 4. There are currently no other active plans for development of the site.

Current uses of Waukegan Harbor can be expected to continue in the future. The harbor serves as a freight harbor for ships unloading gypsum and cement. At the north end of the harbor is a boat storage/servicing facility for recreational boats. The harbor serves as access to this facility. Otherwise, little recreational boating takes place in the harbor. Fishing in the harbor would take place along the breakwater that forms the south boundary of the harbor or from boats.

Possible future expansion of marinas south of Waukegan Harbor, noted in the City's Comprehensive Land Use Plan, may change the volume and/or pattern of use of the newly-constructed slip and boat storage/servicing facility in the northwestern portion of the WCP site. However, space limitations of the new slip will provide an upper bound on potential boat traffic volumes. The new slip is designed for use as a commercial facility. Future uses of the harbor also include the PCB hazardous waste impoundment under construction at the former Slip No. 3.

Current recreational use of nearby areas of the Lake Michigan can be expected to continue in the future. The public beach on Lake Michigan to the east, separated from the site by Pershing Road, is a swimming and recreational area. Lake Michigan is also used for boating and fishing.

In addition to potentially affecting the land uses described above, chemical constituents originating from the WCP site may affect aquatic organisms present in Waukegan Harbor and Lake Michigan. These organisms include fish, bottom-dwelling organisms (benthic macroinvertebrates), and plankton (CH<sub>2</sub>M Hill, 1983). Because continued use of the harbor for boating and industrial purposes will require periodic dredging of accumulated sediments, it is unlikely that a continuous community of benthic macroinvertebrates will be established in the harbor.

Chemical constituents in wastes and soils at the WCP site may affect groundwater quality. The use of groundwater for drinking water supplies in the

Waukegan area is restricted by the 1987 Waukegan Zoning Ordinance. This ordinance indicates that individual wells are not permitted in the I2 and M-CR Districts encompassing the site (Article 11.3-4). In addition, any new subdivisions in the City would be required to tie in to the existing city water supply system (Article 11.3-2). The water intake for the City of Waukegan system is located in Lake Michigan more than 6.000 feet east-southeast of the site.

#### 2.1.5 Potential Exposure Pathways

The land use factors and conceptual model of site conditions described above indicate that risks from contamination that may be identified at the site are likely to be associated with the following potential exposure pathways:

- Exposure of recreational users of the harbor (i.e., boaters and fishermen) and lake (i.e., boaters, fishermen, and swimmers) to compounds released to the surface water from groundwater discharge;
- Exposure of aquatic organisms in the harbor and lake to compounds released to the surface water from groundwater discharge;
- Exposure of people consuming fish from the harbor and lake if the fish accumulated compounds that had been released to the surface water;
- Direct contact of site visitors with waste residuals present in surface soils;
- Direct contact of terrestrial biota with waste residuals present in surface soils;
- Inhalation by site visitors of contaminated dust or volatile compounds released to the ambient air; and
- Exposure of utility workers to contaminated soils by direct contact or inhalation during excavation.

Ingestion of groundwater is not considered a likely exposure pathway because existing institutional controls (i.e., the Waukegan Zoning Ordinance) do not permit individual water supply wells on or near the site and would also require any new developments to tie in to the city water supply system.

The potential exposure of benthic organisms in Waukegan Harbor to contaminants migrating off-site is not considered a major exposure pathway. The dredging of harbor sediments as part of the OMC cleanup, along with continued periodic dredging necessary for harbor maintenance, would prevent the establishment of a permanent community of benthic macroinvertebrates.

Potential exposures of site visitors to contaminants present in soil and groundwater would reasonably be expected to occur under land use scenarios involving continued industrial/marine recreation uses, as prescribed by existing institutional controls (i.e., the Waukegan Zoning Ordinance). Even if residential use of the site is considered as a possible scenario for risk assessment purposes, potential exposures would be limited by: (1) the need to import topsoil for growing grass or shrubs in the site's sandy soils, thereby providing a 4- to 12-inch cover that would limit potential direct contact with contaminated surface soils; and (2) the shallow water table at the site, which would preclude the construction of basements for on-site residences -- the resulting construction methods (likely involving construction on concrete slabs) may mitigate the potential for exposures from volatilization of chemicals into residences.

#### 2.2 Preliminary Identification of Remediation Objectives

#### 2.2.1 General Remedial Action Objectives

General remedial action objectives are defined by CERCLA (as amended by SARA) and the National Contingency Plan (NCP) and are applicable to all Superfund sites. Under CERCLA (as amended by SARA), the statutory scope of remedial actions at all CERCLA sites includes the following general objectives:

 Remedial actions "shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further releases, at a minimum, which assures protection of human health and the environment" (Section 121(d)).

- Preference should be given to selection of remedial actions "in which treatment that permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants is a principal element" (Section 121(b)). An explanation must be published if a permanent solution using treatment or recovery technologies is not selected.
- The selected remedy must comply with or attain the level of "any standard, requirement, criteria, or limitation under any federal environmental law or any promulgated standard, requirement, or limitation under a state environmental or facility siting law that is more stringent than any federal standard, requirement, criteria, or limitation" (Section 121(d)(2)(A)).

The NCP (40 CFR 430[f][1]) lists the following general objectives for selection of a remedy:

- "Each remedial action selected shall be protective of human health and the environment" (40 CFR 430[f][1][A]).
- "On-site remedial actions selected ... must attain those ARARs that are identified at the time of the ROD signature or provide grounds for invoking a waiver" (40 CFR 430[f][1][B]).
- "Each remedial action selected shall be cost-effective provided that
  it first satisfies the threshold criteria" (i.e., protectiveness and
  attainment of ARARs) (40 CFR 430[f][1][D]).
- "Each remedial action shall utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable" (40 CFR 430[f][1][G]).

#### 2.2.2 <u>Site-Specific Remedial Action Objectives</u>

The conceptual site model described above has been used to develop preliminary remediation objectives for the WCP site. The specific objectives are designed to attain the overall project objective of eliminating or mitigating risks to the public health and environment resulting from on-site contamination and potential off-site contaminant migration. The preliminary remediation objectives are:

- 1. To eliminate or mitigate risks associated with exposures to contaminants present in near-surface soils. For soils between zero and two feet below the ground surface, these exposures are expected to include inhalation of contaminated dust, inhalation of volatilized compounds, direct exposure to contaminated soils, or ingestion of contaminated soils. Reasonable land use scenarios for evaluating these risks involve industrial and marine commercial recreational land uses. For soils deeper than two feet below the ground surface and above the water table, exposures may include inhalation or direct contact under construction or excavation scenarios.
- 2. To eliminate or mitigate risks resulting from direct contact with or ingestion of surface waters affected by the discharge of contaminated groundwater from the WCP site, or ingestion of fish affected by such surface waters. These risks may be associated primarily with the more mobile of the identified key contaminants (i.e., BETX and two-and three-ring PAHs) that will be more likely to migrate off-site. Reasonable exposure scenarios for evaluating these risks involve boating and fishing in Waukegan Harbor and swimming, boating and fishing in Lake Michigan.
- 3. To eliminate or mitigate the effects of discharge of contaminated groundwater from the WCP site on water quality at the water intake for the City of Waukegan system. The intake is located in Lake Michigan more than 6,000 feet east-southeast of the site.

4. To eliminate or mitigate risks to the environment resulting from chemical constituents present at or originating from the site. The primary objective will be to protect the aquatic environment in relevant areas of Lake Michigan in accordance with applicable water quality standards. Risks to this environment may be associated with groundwater discharge from the site to Waukegan Harbor and subsequent chemical constituent migration to the lake.

As the RI/FS proceeds, more specific remediation goals will be established for the objectives identified above. For the first objective, the goals will involve soil quality criteria for near-surface soils, established to provide the necessary degree of remediation. For the second and third objectives, goals may involve both groundwater quality and soil quality criteria established to result in acceptable water quality in the relevant surface waters. At this early stage of the RI/FS process, the preliminary remediation goals are dependent to a large degree on readily available information such as chemical-specific ARARs and on preliminarily identified potential exposure scenarios. The PRGs are therefore developed in Section 4 based on the above objectives and the discussion of potential ARARs in Section 3.

#### 3.0 POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

SARA as implemented by the NCP (40 CFR 430[e][9][iii][A]) requires that remedial actions must comply with applicable or relevant and appropriate requirements (ARARs) under federal environmental laws and state environmental laws or facility siting laws or provide grounds for seeking a waiver of the requirement. In addition to ARARs, remedial actions may consider, as appropriate, other advisories, criteria, or guidelines.

#### 3.1 Applicable Requirements

The NCP defines applicable requirements as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA

site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable" (40 CFR 300.5).

For a requirement to be applicable, the remedial action or the circumstances at the site must satisfy all of the jurisdictional prerequisites of that requirement. For example, the minimum technology requirements for landfills under RCRA would be applicable only if a new hazardous waste landfill (or an expansion of an existing landfill) were to be built on a CERCLA site.

#### 3.2 Relevant and Appropriate Requirements

The NCP defines relevant and appropriate requirements as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate (40 CFR 300.5). For example, while RCRA regulations are not applicable to closing in place hazardous waste that was disposed of before 1980, RCRA regulations for closure with hazardous waste in place may be deemed relevant and appropriate.

In some circumstances, a requirement may be relevant to the particular site-specific situation but will not be appropriate because of differences in the purpose of the requirement, the duration of the regulated activity, or the physical size or characteristic of the situation it is intended to address.

#### 3.3 Application of ARARs

A requirement that is judged to be relevant and appropriate must be complied with to the same degree as if it were applicable. Relevant and appropriate requirements that are more stringent than applicable requirements take precedence. More discretion can be applied in the determination of

relevant and appropriate requirements than in the determination of applicable requirements. It is possible for only a part of a requirement to be applicable or relevant and appropriate.

Requirements that must be complied with may be substantive or administrative. On-site CERCLA response actions often must comply with the substantive requirements but not with administrative requirements. Substantive requirements are those that pertain directly to actions or conditions in the environment. Administrative requirements are the mechanisms that facilitate the implementation of the substantive requirements of a statute or regulation. In general, administrative requirements prescribe methods and procedures, such as fees, permitting, inspection, and reporting requirements by which substantive requirements are made effective for purposes of a particular environmental or public health program. In other words, on-site CERCLA response actions must meet the intent of the law but need not conform with all the applicable administrative rules. This distinction applies only to on-site actions; off-site response actions are subject to the full requirements of all applicable standards or regulations, including administrative requirements such as permits.

#### 3.4 Other Criteria or Guidelines to be Considered

In addition to the legally binding requirements established as ARARs, many federal and state programs have developed criteria, advisories, guidelines, or proposed standards that may provide useful information or recommend procedures if no ARARs address a particular situation or if existing ARARs do not provide protection. In such situations, these "to be considered" (TBCs) criteria or guidelines may be used to set remediation goals.

#### 3.5 Classification of ARARS

Three classifications of requirements are defined in the ARAR determination process, chemical-specific, location-specific, and action-specific ARARs. They are defined as:

 Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in or discharged to the environment, e.g., MCLs that establish acceptable concentrations of impurities in drinking water. Potential chemical-specific ARARs are defined in Table 2 and associated numerical values are listed in Tables 3 and 4.

- Location-specific ARARs restrict actions or contaminant concentration in certain environmentally sensitive areas. Examples of areas regulated under various federal laws include floodplains, wetlands, and locations where endangered species or historically significant cultural resources are present. Potential location-specific ARARs are listed in Table 5.
- Action-specific ARARS are usually technology or activity-based requirements or limitations on actions or conditions including specific substances. They establish performance, design, or other similar action-specific controls or regulations on actions, e.g., RCRA incinerator regulations. Potential federal action-specific ARARS are listed in Table 6. Potential state action-specific ARARS are listed in Table 7. The evaluation of action-specific ARARS relative to each developed remedial action will be presented in the RI/FS Report.

#### 3.5.1 Chemical-Specific ARARs

Chemical-specific ARARs include those laws and requirements that regulate the release to the environment of specific substances having certain chemical or physical characteristics or materials containing specified chemical compounds. They are important in determining the extent of soil, sediment, and groundwater remediation as well as determining the residual concentrations allowable after treatment.

#### 3.5.1.1 Soil

Chemical-specific ARARs are not available for soil for the chemicals of concern identified for the site. Risk-based target concentrations can be developed for soil for specific exposure scenarios. These values would be TBCs.

Risk-based target concentrations are presented in Section 4.2 as part of the discussion of Preliminary Remediation Goals (PRGs).

#### 3.5.1.2 Sediment

Chemical-specific ARARS are not available for sediment for the chemicals of concern identified for the site. U.S. EPA Region V has developed guidelines for the evaluation of Great Lakes harbor sediments (U.S. EPA, 1977). These guidelines are a general classification of sediments into categories (e.g., nonpolluted, moderately polluted, etc.) and were developed for disposal of dredged materials. These guidelines are not adequately related to the impact of the sediment on the lakes and therefore are not applicable as ARARS or TBCs.

U.S. EPA is currently developing sediment quality criteria for nonionic organic chemicals based on an equilibrium partitioning approach. A technical approach has been proposed (U.S. EPA 1991) but has not been finalized. These criteria, once finalized, could be TBCs for sediment.

#### 3.5.1.3 Groundwater Quality Standards

The selection of ARARs for groundwater at the site depends on the identification of the appropriate groundwater use category. This has not yet been determined.

EPA's Groundwater Protection Strategy establishes different degrees of protection for groundwater based on vulnerability, use, and value (U.S. EPA, 1986). The NCP states that EPA expects to return usable groundwater to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site (40 CFR 300.430(a)(1)(iii)(F)).

Maximum contaminant level goals (MCLGs) are established under the Safe Drinking Water Act (SDWA). MCLGs that are set at levels above zero are potential ARARs for groundwaters that are current or potential sources of drinking water. Where the MCLG has been set at zero or the MCLGs are not relevant or appropriate to the circumstances of the site (as outlined in 40 CFR

300.400(g)(2), the maximum contaminant level (MCL) is the potential ARAR. MCLs and MCLGs are summarized in Table 3.

The Illinois Pollution Control Board (IPCB) has promulgated groundwater quality standards for four groundwater classes (IPCB, 1991):

- Class I: Potable Resource Groundwater
- Class II: General Resource Groundwater
- Class III: Special Resource Groundwater
- Class IV: Other Groundwater

Class IV groundwater would include any and all groundwater located within a lateral distance of 25 feet or a vertical distance of 15 feet from any primary or secondary source at the WCP site. The remedial investigation has not yet defined the vertical extent of contamination at the site. This class of groundwater would apply to the wood treating area, the MGP/coking area, the northeast pond area, and potentially other zones at the site as well, on the basis of classifying these areas as primary or secondary sources. Groundwater in areas of former coal storage and handling may be Class IV groundwater under 35 ILL. Admin. Code 620.240(f) and (g). The Class IV standards are equal to the existing concentrations of constituents in the groundwater. No standards for Class IV are listed in Table 3, as the existing concentrations are still being defined by the remedial investigation.

Class II Groundwater would include all groundwater outside the Class IV zone, but less than 10 feet below the ground surface. Class II standards are listed in Table 3.

Class I groundwater may apply to groundwater that is outside the Class IV zone and is greater than 10 feet below the ground surface. This designation is for groundwater-bearing formations that can be developed for potable water supply. Water in the unconsolidated sand 10 feet or more below the ground surface appears to meet the criteria for Class I groundwater for portions of the WCP site that are outside Class II and Class IV zones. The Class I standards are listed in Table 3.

The groundwater rules permit a groundwater management zone (620.250) for groundwater being managed to mitigate impairment caused by the release of contaminants from a site. Alternative groundwater standards are applied to groundwater management zones. During the corrective action, the groundwater is exempt from the Class I through IV standards. After remediation, concentrations may exceed the groundwater standards if, to the extent practicable, the exceedence has been minimized and beneficial use has been returned and any threat to public health or the environment has been minimized.

Groundwater may also be reclassified by petition to the IPCB. The reclassification procedure is outlined in 35 ILL. Adm. Code 620.260.

Lifetime health advisories (HAs) are issued by U.S. EPA's Office of Water. These are TBCs for groundwater subject to potable water use. Lifetime HAs are developed only for noncarcinogenic health effects.

Risk-based target concentrations can be developed for potable use of groundwater for specific groundwater uses and exposure scenarios. These values are TBCs. The risk-based target concentrations are described in Section 4.2 as part of the discussion of PRGs.

#### 3.5.1.4 Surface Water Quality Standards

Chemical-specific ARARs for the protection of human health and aquatic life from exposure to contaminants in Lake Michigan are important at the WCP site because: (1) the lake may be affected by chemical constituents in groundwater discharge from the site; and (2) several possible remedial alternatives could include discharge of treated water to the lake.

Federal water quality criteria (FWQC) established under Section 303 or 304 of the Clean Water Act (CWA) for priority pollutant may be relevant and appropriate, depending on the circumstances of the site (40 CFR 310.430(e)(2)(i)(E). FWQC for human health are promulgated for exposures that include drinking water and consuming fish and consuming fish only. These FWQC are listed in Table 4. FWQC for aquatic life protection are also promulgated and are listed in Table 4.

At the time of the development of the FWQC for aquatic life protection, sufficient data were not available to derive aquatic life criteria for all of the priority pollutants. The lowest report effects levels (LRELs) available in the scientific literature for these chemicals were published in lieu of criteria. The LREL would be TBCs and are summarized in Table 4.

There are some situations where FWQC will not be both relevant and appropriate in light of other potential ARARs. Whether a FWQC is relevant and appropriate depends on the availability of standards, such as an MCL or state water quality standard specific for the constituent and use.

Illinois Water Quality Standards (IWQS) are promulgated as part of the Illinois Water Pollution Control Rules (35 Ill. Adm. Code Subtitle C, Part 302). Lake Michigan waters are subject to standards under Subpart E (Lake Michigan Water Quality Standards). Lake Michigan water quality standards apply in addition to either (depending on water use) the general use (Subpart B) or the public and food processing water supply standards (Subpart C). The IWQS are presented in Table 4.

#### 3.5.2 Location-Specific ARARs

Location-specific ARARS are those requirements that relate to the geographical position of the site. The location-specific requirements currently identified as potential ARARS for CERCLA remedial actions are listed in Table 5. There are no applicable location-specific ARARS for the WCP site.

#### 3.5.3 Potential Action-Specific ARARs

Action-specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances. Potentially applicable ARARs are listed in Tables 6 and 7.

#### 4.0 PRELIMINARY REMEDIATION GOALS

Remediation goals consist of medium-specific or operable unit-specific chemical concentrations that are protective of human health and the environment and serve as goals for the remedial action (U.S. EPA, 1990). The goals presented below are preliminary and serve to focus the development of remedial alternatives. These PRGs will be modified in the risk assessment to reflect additional site-specific information gathered in the remedial investigation process. The remediation goals in the risk assessment and subsequent evaluation processes will be developed consistent with the presence of an adjacent and overlapping PCB site and the risk levels embodied in the PCB remedy selection. Final selection of remedial goals for the WCP site must await the final remedy selection process and balancing of criteria in the record of decision process.

Chemical-specific PRGs are concentration goals for individual chemicals at CERCLA sites. There are two general sources of chemical-specific PRGs:

- Concentrations based on ARARs (ARAR-based PRGs)
- Concentrations based on risk assessment (risk-based PRGs)

Where chemical specific ARARs clearly exist for a chemical of concern, the ARAR is the basis of the PRG. Where chemical specific ARARs are not available risk-based PRGs may be developed. The procedure for developing risk-based PRGs is presented in Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual - Part B, Development of Risk-based Preliminary Remediation Goals (RAGS-Part B) (U.S. EPA 1991b).

Preliminary remediation goals were selected by identifying: (1) the chemicals and media of concern, as outlined in the description of the site conceptual model (Section 2); (2) chemical-specific ARARs, if available, as described in Section 3; and (3) other criteria to be considered (TBCs), if ARARs are not available.

#### 4.1 <u>Soil</u>

The current conceptual model of the site indicates that soil will be a likely media of concern at the WCP site. The ultimate remediation goals for soils are likely to be based on: (1) potential exposures to contaminants present in near-surface soils via the exposure routes described in Section 2.2; and (2) potential exposures to contaminants present in subsurface soils by leaching of soil contaminants to groundwater and subsequent migration to surface waters.

The selection of exposures relevant to near-surface soil is guided by land use factors and potential exposure pathways as outlined in Sections 2.1.4 and 2.1.5, respectively. Future land uses can reasonably be expected to be continued industrial and commercial marine recreational uses (i.e., boat storage and servicing), consistent with City Zoning Ordinances.

There are no ARARs for soil and consequently the PRGs are risk-based. The RAGS-Part B outlines approaches to soil PRGs based on residential and industrial land uses. The industrial land use scenario is most consistent with the future land use at the site.

An industrial/marine commercial soil ingestion exposure pathway forms the basis of the near-surface soil PRGs. It is the most likely exposure pathway for a future industrial/commercial use of the site. A method for calculating chemical-based PRGs, including default occupational soil ingestion exposure assumptions is provided in RAGS-Part B.

The default exposure assumptions may not be entirely applicable to future industrial/commercial uses of the site. For example, exposure to surface soil may be limited by the weather (e.g., snow cover, frozen ground in the winter) and the limited boating season. The RAGS-Part B guidance does not account for this and assumes exposure five days/week. In order to reflect these site specific weather concerns, the exposure frequency has been adjusted to eliminate cold weather months (i.e., the number of days exposed reflects days above 32°F) and precipitation events. Other aspects of the exposure scenario outlined in

RAGS-Part B also may not be appropriate to describe a site use where there is limited exposure to soils, such as an office park or marina.

The target risk levels used suggested by EPA guidance (U.S. EPA 1991b) correspond to the following:

- For carcinogenic effects, a concentration that corresponds to a 10-6 incremental risk of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen from all significant exposure pathways for a given medium.
- For noncarcinogenic effects, a concentration that corresponds to a hazard index of one, which is the level of exposure to a chemical from all significant exposure pathways for a given medium below which it is unlikely for even a sensitive population to experience adverse health effects.

The 10-6 risk corresponds to the "point of departure" indicated in the NCP as a starting point for analysis of remedial alternatives. It reflects EPA's preference for managing risks at the more protective end of the risk range, other things being equal. Use of "point of departure" target risks does not reflect, however, a presumption that the final remedial action should attain such goals (U.S. EPA 1991b). U.S. EPA uses a risk range from 10-4 to 10-6 to describe protectiveness. A risk of 10-4 may be an appropriate target risk when the potential for exposure is limited, such as in the described industrial/commercial exposure scenarios. PRGs for carcinogens were estimated for the 10-6 point of departure risk, as well as for the 10-4 risk level, to reflect a range of potential remedial goals.

The risk-based PRGs for near-surface soils are summarized in Table 8. The computed PRG concentrations for individual carcinogenic PAHs at the 10<sup>-4</sup> risk level range from 253 mg/kg to 25,300 mg/kg. At the 10<sup>-4</sup> risk level, the computed PRG concentrations for individual PAHs range from 2.5 to 253 mg/kg. It is anticipated that a concentration goal will be developed later in the RI/FS process for total carcinogenic PAHs based on several factors, including: 1) additional soil quality data to be collected during Phase II of the RI; 2) the

results of the risk assessment's refined evaluation of exposure scenarios and associated risks; and 3) consideration of carcinogenic potency differences among the individual carcinogenic PAHs. Preliminary evaluations of total carcinogenic PAH concentrations that corrrespond to the PRGs in Table 8 fall between 253 and 25,300 mg/kg for the 10<sup>-4</sup> risk level and between 2.5 and 253 mg/kg for the 10<sup>-4</sup> risk level.

Remediation goals for subsurface soils cannot be determined for chemicals that may leach to groundwater until site-specific data regarding soil quality, contaminant partitioning to groundwater, groundwater flow characteristics, and mixing with surface waters are more completely evaluated. However, the selection of remediation goals for subsurface soils will necessarily depend on corresponding remediation goals for groundwater and surface waters. Preliminary numerical remediation goals for surface waters are represented by the ARARs presented in Table 4.

#### 4.2 Groundwater

The groundwater PRGs will reflect the potential groundwater use. The potable use of groundwater appears unlikely. It is more likely that remediation goals for groundwater will be established to protect surface water quality to the degree necessary to protect uses of Lake Michigan. Contaminant fate and transport assessments, along with surface water quality data, will be used to evaluate the impacts on surface water quality of site contaminants discharged in the groundwater.

The surface water ARARs listed in Table 4 will most likely form the basis for calculation of groundwater PRGs. If an ARAR-based PRG is not available or appropriate, a risk-based PRG may serve as the basis for calculation of a groundwater PRG. Remediation goals for groundwater will also be sufficient to protect water quality at the City of Waukegan water supply intake. ARARs for water quality at the water supply intake are the IWQSs, MCLs, and MCLGs for community water supplies (Tables 3 and 4).

#### REFERENCES

- Barr Engineering Co., 1992. Remedial Investigation/Feasibility Study Phase I Technical Memorandum, Waukegan Manufactured Gas and Coke Plant Site. July 1992.
- U.S. EPA 1991. <u>Proposed Technical Basis for Establishing Sediment Ouality</u>
  <u>Criteria for Nonionic Organic Chemicals Using Equilibrium Partitioning.</u>
  Office of Water, Health and Ecological Criteria Division. August 1991.
- U.S. EPA 1977. "Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments". U.S. EPA Region V. April 1977.

#### TABLE 1

### POLYCYCLIC AROMATIC HYDROCARBON (PAH) COMPOUNDS OF CONCERN

#### Carcinogenic PAHs\*

Benzo(a)Anthracene
Benzo(b)Fluoranthene
Benzo(k)Fluoranthene
Dibenzo(ah)Anthracene
Indeno (1,2,3-cd)Pyrene
Chrysene

#### Non-Carcinogenic PAHs

Acenaphthene
Acenaphthylene
Anthracene
Benzo(ghi)Perylene
Dibenzofuran
fluoranthene
Fluorene
2-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene

<sup>\*</sup>Listed as potential or suspected carcinogens, U.S. EPA.

TABLE 2

### POTENTIAL CHEMICAL-SPECIFIC ARARS WCP SITE

REGULATION	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
Groundwater			
Safe Drinking Water Act (SDWA) - Maximum Contaminant Levels (MCLs) 40 CFR 141.61 (organic chemicals) 40 CFR 141.62 (inorganic chemicals)	CERCLA 121(d) states that a remedial action will attain a level under the SDWA. MCLs are enforceable maximum permissible level of a contaminant which is delivered to any user of a public water system.	Potentially relevant and appropriate.	MCLs are relevant and appropriate for potential drinking water sources by EPA policy (see NCP). Aquifer status to be determined. Alternative concentration limits (ACL) approach outlined in NCP may be used if MCLs are not appropriate for the site.
SDWA - Maximum Contaminant Level Goals (MCLGs) 40 CFR 141.50 (organic chemicals) 40 CFR 141.51 (inorganic chemicals)	CERCLA 121(d)(2)(A) states that a remedial action attain MCLGs where relevant and appropriate. MCLGs are non-enforceable health goals under the SDWA.	Potentially relevant and appropriate.	MCLGs equal to zero are not appropriate for cleanup of groundwater or surface water at CERCLA sites by EPA policy (see NCP). Non-zero MCLGs may be relevant and appropriate.
SDWA - Secondary MCLs (SMCLs) 40 CFR 143	Non-enforceable limits intended as guidelines for use by states in regulating water supplies	To be considered.	SMCL's may be considered if drinking water use of aquifer is considered feasible.
Office of Drinking Water. Drinking water health advisories.	Guidance levels for drinking water issued by Office of Drinking Water	To be considered.	May be applicable for chemicals without MCLs if groundwater is to meet drinking water quality.
Illinois Water Quality Standards (IWQS) 35 Ill. Adm. Code 620	Groundwater must meet the standards appropriate to the groundwater's class as specified in Subpart D/Section 620.401-440.	Potentially relevant and appropriate.	May be applicable depending on groundwater use designation.
IMQS Class I: Potable Resource Groundwater (Section 620.210; 620.410)	Standards for potential potable water supply.	Potential ARAR.	Not applicable to groundwater where 10 feet or less from ground surface. Could be applicable if groundwater were designated for potable water use.
IWQS Class II: General Resource Groundwater (Section 620.220; 620.420)	Applicable to groundwater compatible with agricultural, industrial, recreational, or beneficial uses and not in Classes I, III, or IV.	Potential ARAR.	May be applicable if groundwater is not designated for potable use.

### POTENTIAL CHEMICAL-SPECIFIC ARARS WCP SITE

REGULATION	REQUIREMENT	POTENTIAL ARAR STATUS	ANALYSIS
Class III: Special Resource Groundwater (Section 620.230; 620.430)	Applicable to groundwater determined by Pollution Control Board as demonstrably unique and suitable for more stringent standard than otherwise applicable, vital for sensitive ecosystem; discharge to dedicated nature preserve.	Not a potential ARAR.	Not appropriate. Groundwater is not demonstrably unique nor does it discharge to dedicated nature preserve.
Class IV: Other Groundwater (Section 620.240; 620.440)	Other groundwater includes: groundwater which underlies potential primary or secondary source, groundwater underlying various coal mining and processing areas, and groundwater within previously mined areas.	Potential ARAR.	May be applicable. Groundwater underlies a source area, and site operations included coal processing.
Alternative Groundwater Quality Standards - Groundwater Quality Restoration Standards (Section 620.450(a))	Applies to groundwater within a groundwater management zone. May allow concentrations higher than designated use after remediation.	Potential ARAR.	May apply if IEPA concurrence is obtained.
Surface Water			
Illinois Water Quality Standards Illinois Administrative Code, Title 35, Subtitle C, Chapter 1, Part 302	Section 11 of Environmental Protection Act - regulation to restore, maintain, and enhance purity of the water of the state.	Potential ARAR.	See specific category.
- General Use - Subpart B Sections 302.201-212	Waters of state for which there is no specific designation  - acute standards apply within mixing zone - chronic apply after mixing zone	Potential ARAR.	Applies to Lake Michigan, cumulative with Subpart E standards.
- Public and food processing water supply - Subpart C; Sections 302.301-305	Applies to waters of state designated for waters drawn for treatment and distribution as a potable supply or food processing at the point of withdrawal.	Potential ARAR.	Applies to Lake Michigan at point of water withdrawal, cumulative with Subpart E requirements.

### POTENTIAL CHEMICAL-SPECIFIC ARARS WCP SITE

REGULATION	REGULATION REQUIREMENT		ANALYSIS
- Secondary Contact and Indigenous Aquatic Life Standards. Subpart D - Sections 302.401-410.	Applicable to waters designated in 35 Ill. Adm. Code 303.204 and 303.441.	Not potential ARAR.	Does not apply to Lake Michigan.
- Subpart E: Lake Michigan Water Quality Standards. Section 302.501-509	Applicable to waters of Lake Michigan.	Potential ARAR.	Subpart E is applicable to Lake Michigan - cumulative with Subparts B or C.
Federal Water Quality Criteria (FWQC) established under Section 303 and 304 of Clean Water Act	Protection of human health from consumption of fish and water; consumption of fish.	Potential ARAR.	Relevant but not appropriate. Depends on use of surface water and availability of other ARARs. State water standards available.
	Protection of aquatic life.	Potential ARAR.	May be applicable to Lake Michigan but state water quality standards may override.

TABLE 3

# POTENTIAL CHEMICAL-SPECIFIC ARARS AND TO BE CONSIDERED CRITERIA GROUNDWATER - DRINKING WATER USE WCP SITE

(Concentrations in  $\mu g/L$ )

	Potential ARARS				To Be Considered		
			161	1 GVS <sup>b</sup>		Risk-Based PRGs <sup>d</sup>	
Chemical	MCLs*	MCLGs <sup>a</sup>	Class I	Class II	Health Advisories <sup>c</sup>	Toxicity <sup>®</sup>	10 <sup>-6 f</sup>
Benzene	5	0	5	25			0.35
Ethylbenzene	700	700	700	1000	700	1600	
Toluene	1000	1000	1000	2500	1000	970	
Xylenes (total)	10000	10000	10000	10000	10000		
BETX			11705	13525			
Phenol					4000	2200	
Phenols			100	100			
Acenaphthene						2200	
Acenaphthylene							
Anthracene						11000	
Benzo(a)anthracene							0.15
Benzo(a)pyrene	0.2	0					0.015
Benzo(b)fluoranthene							0.15
Benzo(g,h,i)perylene							
Benzo(k)fluoranthene							0.15
Chrysene							1.5
Dibenzo(a,h)anthrancene							0.015
Fluoranthene						1500	
Fluorene						1500	
indeno(1,2,3-cd)pyrene							0.15

# POTENTIAL GHEMICAL-SPECIFIC ARARS AND TO BE CONSIDERED CRITERIA GROUNDWATER - DRINKING WATER USE WCP SITE

(Concentrations in  $\mu g/L$ )

		Potenti	al ARARS	To Be Considered			
				1 GWS <sup>b</sup>		Risk-Bas	ed PRGs <sup>d</sup>
Chemical	MCLs*	MCLGs <sup>0</sup>	Class I	Class II	Health Advisories <sup>c</sup>	Toxicity <sup>a</sup> ,	10 <sup>-6 f</sup>
2-Methylnaphthalene							
<b>Haphthalene</b>					20	150	
Phenanthrene							
Pyrene						1100	
Cadmium	5	5	5	50	5	18	=
Selenium	50	50	50	50		. 180	
Cyanide	200	200	200	600	. 200	730	
Arsenic	50		50	200		11	0.049

MCLs - Maximum Contaminant Level

MCLG - Maximum Contaminant Level Goal

IGWS - Illinois Groundwater Standards

Class I Section 620.410 - Potable Resource Waters

Class II Section 620.420 - General Resource Groundwater

- C Lifetime Health Advisories issued by U.S. EPA Office of Water (U.S. EPA 1992).
- Risk-based PRGs assumed exposure 350 days/year, 30 years; water ingestion of 2 liters/day; body weight of 70 kg; inhalation of volatile compounds relevant to indoor air from drinking water with an inhalation rate of 15 mg/day.
- PRGs for non-carcinogens assumes a hazard quotient of 1 for non-carcinogenic health effects.
- PRG for carcinogens set a 1 in 1,000,000 individual excess lifetime cancer risk level, based on the exposure assumptions in footnote .

TABLE 4

### POTENTIAL CHEMICAL-SPECIFIC ARARS SURFACE WATER

WCP SITE

(Concentrations in  $\mu g/L$ )

				Pote	ntial ARARs							
		Illinois Water Quality Standard							TBCs			
	FWQC Aqu	atic Life"	Subp	art 8 Genera	l Use <sup>c</sup>		Subpart D	Subpart E	Lowest Reported Effects Level <sup>9</sup>			
Chemical	Acute	Chronic	AS	cs	Standard	Subpart C Public/Food	Secondary Contact	Lake Michigan	Acute	Chronic		
Ammonia as N					15,000		2,500/4,000	20	i	í		
Ammonia, unionized					0.04				i	i		
Arsenic (III)	360	190	360	190		50	1,000					
Cadmium	6.9 <sup>h</sup>	6.7 <sup>h</sup>	67.1 <sup>h</sup>	1.7		10	150		<u>-</u> -			
Cyanide	22	5.2	22	5.2			100					
Selenium	20	5			1,000	10	1,000	,				
Benzene			- <u></u>		<u> </u>				5,300	<u> </u>		
Ethylbenzene									3,200			
Toluene									17,500	<u> </u>		
Xylene												
Phenols			<del></del>		100	1	300					
Phenol			•		<u> </u>				10,200	2,560		
·			_							<b>,</b>		
Acenaphthene									1,700			
Acenaphthylene												
Anthracene												
Benzo[a] anthracene												
Benzo[b] fluoranthene			<del> </del>									
Benzo[g,h,i]perylene												

# POTENTIAL CHEMICAL-SPECIFIC ARARS SURFACE WATER WCP SITE (Concentrations in µg/L)

				Poter	ntial ARARs					
			Illinois Water Quality Standard					TI	ICs	
	FWQC Aqui	atic Life <sup>s</sup>	Subpart B General Use <sup>c</sup>			Subpart D	Subpart E	Lowest Reported Effects Level <sup>8</sup>		
Chemical	Acute	Chronic	AS	cs	Standard	Subpart C Public/Food	Secondary Contact	Lake Michigan <sup>1</sup>	Acute	Chronic
Benzo[k] fluoranthene			· <del></del>							
Chrysene								<u> </u>		
Dibenzo[a,h]anthrancene					<u> </u>					
Fluoranthene									3,980	
Fluorene										<u> </u>
Indeno[1,2,3-cd]pyrene			· · · · · · · · · · · · · · · · · · ·							<u> </u>
2-Methylnaphthalene										
Naphthalene									2,300	620
Phenanthrene										
Pyrene										

- Federal Ambient Water Quality Criteria for aquatic life protection.
- Illinois Water Quality Standards 35 Ill. Adm. Code Subtitle C, Chapter 1, Part 302.
- General use standards include acute standards (AS), chronic standards (CS), and other standards to be met in waters of the state for which there is no specific designation.
- For public and food processing water supply standards. Cumulative with general use standards. To be met at point at which water is withdrawn.
- Standards for secondary contact and indigenous aquatic life standards. Met for designated water only.
- Lake Michigan standards. They are cumulative with Subpart B and C standards.
- To-be-considered. Lowest reported effects level (LREL) reported in ambient water quality criteria (U.S. EPA 1980).
- Based on hardness. Hardness assumed to be 165 mg/L based on Waukegan Harbor RAP (IEPA 1992).
- Based on pH and temperature. See U.S. EPA 1986.

TABLE 5

POTENTIAL LOCATION-SPECIFIC ARARS
WCP SITE

Location-Specific Concern	Requirement	Prerequisite	Citation	Potential ARAR Determination	<u>Analysis</u>
<b>Wettand</b>	Action to prohibit discharge of dredged or fill material into wetlands without permit	Wetlands as defined in U.S. Army Corps of Engineers regulations	Clean Water Act section 404; 40 CFR Parts 230, 33 CFR Parts 320-330	Not ARAR	No designated wetland on the site.
	Action to avoid adverse effects, minimize potential harm, and preserve and enhance wetlands, to the extent possible	Action involving construc- tion of facilities or management of property in wetlands, as defined by 40 CFR Part 6, Appendix A, section 4 (j)	Executive Order 11990, Protection of Wetlands, 40 CFR Part 6, Appendix A	NOT ARAR	No designated wetland on the site.
Wilderness area	Area must be administered in such manner as will leave it unimpaired as wilderness and to preserve its wilderness	Federally-owned area designated as wilderness area	Wilderness Act (16 USC 1131 et seq.); 50 CFR 35.1 et seq.	Not ARAR	Site not designated as a federal wilderness area.
Wildlife refuge	Only actions allowed under the provisions of 16 USC Section 668 dd(c) may be undertaken in areas that are part of the National Wildlife Refuge System	Area designated as part of National Wildlife Refuge System	16 USC 668dd <u>et seg.;</u> 50 CFR Part 27	Not ARAR	Site not designated as s National Wildlife Refuge.
Arem affecting stream or river	Action to protect fish or wildlife	Diversion, channeling or other activity that modifies a stream or river and affects fish or wildlife	fish and Wildlife Coordination Act (16 USC 661 et seg.); 40 CFR 6.302	Not ARAR	No stream modification anticipated.
Within area affecting national wild, scenic, or recreational river	Avoid taking or assisting in action that will have direct adverse effect on scenic river	Activities that affect or may affect any of the rivers specified in section 1276(a)	Wild and Scenic Rivers Act (16 USC 1271 et seq.); 40 CFR 6.302(e)	Not ARAR	No national wild or scenic rivers are located on site or will be impacted by site remediation.
Within coestal zone	Conduct activities in manner consistent with approved State management programs	Activities affecting the coastal zone including lands therein and thereunder and adjacent shorelands	Coastal Zone Management Act (16 USC Section 1451 <u>et</u> <u>seq.</u> )	Not ARAR	Site is not in a coastal area.
Within designated coastal barrier	Prohibits any new Federal expenditure within the Coastal Barrier Resource System	Activity within the Coastal Barrier Resource System	Coastal Barrier Resources Act (16 USC 3501 <u>et seq.</u> )	Not ARAR	No dredge and fill activities planned.
Within 61 meters (200 feet) of a fault displaced in Holocene time	New treatment, storage or disposal of hazardous waste prohibited	RCRA hazardous waste, treatment, storage or disposal	40 CFR 264.18(a)	Not ARAR	There is no evidence of a potentially active fault within 61 meters of site

### POTENTIAL LOCATION-SPECIFIC ARARS WCP SITE

Location-Specific Concern	Requirement	<u>Prerequisite</u>	Citation	Potential ARAR Determination	Anglysis
Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout	RCRA hazardous waste, treatment, storage, or disposal	40 CFR 264.18(b)	Not ARAR	Site not within 100-year floodplain
Within floodplain	Action to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values	Action that will occur in a floodplain, i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood prone areas	Executive Order 11968, Protection of floodplains (40 CFR 6, Appendix A); Fish and Wildlife Coordination Act (16 USC 661 et seq.); 40 CFR 6.302	Not ARAR	Site actions not within floodplein
Within salt dome formation, underground mine, or cave	Placement of non- containerized or bulk liquid hazardous waste prohibited	RCRA hazardous waste, placement	40 CFR 264.18(c)	Not ARAR	Site does not contain salt dome, mines, or caves
Within area where action may cause irreperable harm, loss, or destruction of significant artifacts	Action to recover and preserve artifacts	Alteration of terrain that threatens significant scientific, prehistorical, historical, or archaeological data	National Historical Preservation Act (16 USC Section 469); 36 CFR Part 65	Not ARAR	There are no known archaeological or historical artifacts on the site
Historic project owned or controlled by Federal agency	Action to preserve historic properties; planning of action to minimize harm to National Historic Landmarks	Property included in or eligible for the National Register of Historic Places	Mational Historic Preservation Act, Section 106 (16 USC 470 et seg.); 36 CFR Part 800	Not ARAR	Site not on the National Register of Historic Places
Critical habitat upon which endangered species or threatened species depends	Action to conserve endangered species or threatened species, including consultation with the Department of Interior	Determination of presence of endangered or threatened species	Endangered Species Act of 1973 (16 USC 1531 et seq.); 50 CFR Pert 200, 50 CFR Pert 402 fish and Wildlife Coordination Act (16 USC 661 et seq.); 33 CFR Perts 320-330	Unlikely ARAR	No endangered species are known to exist at the site. No evidence of unique habitat is present.

#### TABLE 6

### POTENTIAL FEDERAL ACTION-SPECIFIC ARARS WCP SITE

<u>Fede</u>	ral Regulations	Requirement	Potential ARAR Status	Analysis
CLEAN AIR ACT	ī			
	ion 101 CFR 52)	Development and implementation of regional air pollution control programs. Section 101 as implemented by 40 CFR 52, delegates primary responsibility for regional air quality management to the states.	Potentially applicable	Regulation promulgated under the Clean Air Act may apply to possible actions at the site that generate air emissions. Air stripping may be subject. See State air regulations.
+	ion 109 CFR 50)	National Ambient Air Quality Standards.  Pre-construction review for new sources	Not applicable Potentially relevant and appropriate	Remedial action could result in new sources of air emissions. Purpose of this review is to obtain construction permit. Permits exempted for on-site CERCLA actions, however, this review would meet requirement to fulfill substantive requirements and condition of permitting process.
		<ul> <li>Major source permit, PSD permit, nonattainment permit, visibility permit.</li> </ul>	Not applicable. Potentially relevant but not appropriate	Emissions from site activities not anticipated to qualify as major source, therefore, exempt from substantive requirements of reviews and permits.
	onal Emission Standards for rdous Pollutants	Requires limiting ambient hydrogen sulfide emissions to less than 0.1 ppm. The regulation also includes emission standards for mercury, vinyl chloride, benzene, beryllium, inorganic arsenic, and radio nuclide.	Potentially applicable	Emissions from air stripper must meet standards.

### POTENTIAL FEDERAL ACTION-SPECIFIC ARARS WCP SITE

Federal Regulations	Requirement	Potential ARAR Status	Analysis
CLEAN WATER ACT			
National Pollutant Discharge Elimination System (NPDES) 40 CFR 122, 125	Regulate the discharge of water into surface water bodies. The State of Illinois has authority to administer NPDES in Illinois. Refer to State ARARs.	Potentially applicable	The remedial action may include the discharge of treated or untreated groundwater to Lake Michigan. Substantive requirements will have to be met, although administrative requirements (a permit) may not be required because action is on-site.
Effluent Guidelines, Pretreatment Standards 40 CFR 403	Section establishes pretreatment standards for the control of pollutants discharge to POTWs. The POTW should have either an EPA-approved program or sufficient mechanism to meet the requirements of the national program in accepting CERCLA waste.	Potentially applicable	Discharge to POTW possible alterative. It is considered an off-site action. Pretreatment regulations are applicable.
Ocean Discharge 40 CFR 277	NPDES permit required to discharge to marine water.	Not applicable Not relevant	Not relevant to situation.
Dredge and Fill Requirement 40 CFR 230	Regulates the discharge of dredged or fill material into the water of the U.S.	Not applicable Not relevant	No dredging or filling anticipated.
SAFE DRINKING WATER ACT			
Underground Injection Control Program 40 CFR 144	Controls the underground injection of wastes and treated wastewater.	Portions potentially applicable; May be relevant and appropriate	Not relevant to situation unless underground injection is considered as part of in situ groundwater remediation.
RESOURCE CONSERVATION AND RECOVERY ACT (RCR	<b>A</b> )		
Criteria for Classification of Solid Waste Disposal Facilities and Practices 40 CFR 257	Identifies which solid waste disposal facilities and practices have adverse effects on health and environment.	Not applicable. Potentially relevant and appropriate	Disposal at site occurred prior to October 15, 1979. May be applicable to long-term containment of contaminated soils on site.

### POTENTIAL FEDERAL ACTION-SPECIFIC ARARS WCP SITE

Federal Regulations	Requirement	Potential ARAR Status	Analysis		
Hazardous Waste Management System 40 CFR 260	Management of generation, treatment storage, disposal, and transport of hazardous waste. State of Illinois administers RCRA in Illinois. Refer to State ARARs.	Coal tar/coke plant wastes: May be applicable  May be relevant and appropriate  Treatment residues: May be applicable  May be relevant and appropriate	Wastes were placed on-site prior to 1980, therefore, RCRA is not applicable to on-site actions. Coal tar mastes are not listed wastes, therefore, RCRA may not be applicable to on-site or off-site actions constituting treatment or disposal. Coal tars are similar to KO60 and KO87 listed waste (coke plant by-products), therefore, RCRA as a whole may be relevant and appropriate for on-site actions.		
Classification of Coke and By- Product Coal Tar FR Vol. 56, No. 35, February 21, 1991.	Reclassification of tar decanter sludges (KO87) as products when used as waste- derived fuels.	May be relevant and appropriate.	Coal tars may be similar to KO87 listed wastes.		
Boiler and Industrial Furnace Rules FR Vol. 56, No. 35, February 21, 1991	Regulates air emissions from the burning of hazardous wastes in boilers and individual furnaces.	Potentially applicable; may be relevant and appropriate.	Potentially applicable for alternatives involving incineration of wastes, if RCRA hazardous.		
,=-,,		Applicable	Potentially applicable to treatment residues or wastes taken off-site, if RCRA hazardous.		
Standards for Generators 40 CFR 262 Establishes regulation covering activities of generators of hazardous wastes - requirements include ID number, record keeping, and use of uniform national manifest.		Potentially applicable	Applicable to off-site actions if waste or treatment residues are RCRA hazardous.		
Standards for Transport 40 CFR 263			Applicable to off-site action if wastes or treatment residues are RCRA hazardous.		

REGULATIONS FOR OWNERS AND OPERATIONS OF PERMITTED

cleanup

### POTENTIAL FEDERAL ACTION-SPECIFIC ARARS WCP SITE

Federal Regulations	Requirement	Potential ARAR Status	Analysis
REGULATIONS FOR OWNERS AND OPERATIONS OF PERMITTED HAZARDOUS WASTE FACILITIES			
Subpart G - Closure 40 CFR 264.111 264.117C	Concern site closure requirements, including operation and maintenance, site monitoring, record keeping, and site use.	Not applicable Potentially relevant and appropriate	Sume actions consider leaving wastes in place. If RCRA is deemed relevant and appropriate in general to these wastes, then closure requirements may also be relevant and appropriate.
Subpart I - Storage Container 40 CFR 264.171-178	Requirement concern permits on- site storage of hazardous wastes or temporary storage phases during cleanup actions.  Requirements for maintenance of storage containers, compatibility with waste, inspection, storage area, location and closure.	Not applicable Potentially relevant and appropriate	May be relevant and appropriate to storage of wastes prior to off-site shipment if RCRA is determined relevant and appropriate for wastes.
Subpart J - Tank Storage 40 CFR 264.191-198	Requirements apply to tank storage of hazardous materials.	Not applicable Potentially relevant and appropriate	Tank storage is not anticipated; treatment in tanks may be considered.
Subpart K - Surface Impoundments 40 CFR 264.221-228	Requirements for hazardous waste containment using new or existing surface impoundments.	Not applicable Not relevant and appropriate	No surface impoundments are anticipated.
Subpart L - Waste Piles 40 CFR 264.251-258	Requirements for hazardous waste kept in piles.	Not applicable Potentially relevant and appropriate	Temporary waste piles not subject to RCRA; may be relevant and appropriate for long-term storage piles.
Subpart M - Land Treatment 40 CFR 264.271-283	Requirements pertain to land treatment of hazardous wastes	Potentially applicable	Applicable if land treatment is used and wastes or treatment residues are RCRA hazardous.
Subpart N - Landfills 40 CFR 264.301-314 (New Landfills)	Requirement for design, operation, and maintenance of a new hazardous waste landfill. Includes minimum technology requirements under HSWA.	Not applicable Not relevant	Creation of a new landfill is not an action considered. Actions anticipated do not constitute placement.

### POTENTIAL FEDERAL ACTION-SPECIFIC ARARS WCP SITE

Federal Regulations	Requirement	Potential ARAR Status	Analysis		
Closure 40 CFR 261.310	Requirement for closure of landfill with waste in place. Includes requirement for capping, monitoring.	Not applicable Potentially relevant and appropriate	Wastes may be left in place. If RCRA is deemed relevant and appropriate for the waste, closure requirements may be deemed relevant and appropriate.		
Subpart 0 - Incinerators 40 CFR 264-340-351	Requirements for hazardous waste incinerators	Not applicable Not relevant and appropriate	On-site incinerator is not considered for this site.		
Subpart X - Miscellaneous Treatment 40 CFR 264, Subpart X	Standards for performance of miscellaneous treatment units. Miscellaneous treatment units may include temporary waste holding units or effluent pretreatment units.	Not applicable Potentially relevant and appropriate	Subpart X may apply to use of on-site physical, chemical, or biological treatment technologies if RCRA is determined to be relevant and appropriate overall.		
Land Disposal Restrictions 40 CFR 268, Subpart C and Subpart D	The land disposal restrictions and treatment requirements for materials subject to restrictions on land disposal.	Not applicable Not relevant	On-site land disposal (i.e., new placement) not anticipated, therefore, land ban would not be triggered.		
TOXIC SUBSTANCES CONTROL ACT (TSCA) PCBs 40 CFR 761					
	Requirement for disposal of PCBs.	Likely not relevant to site	PCBs not identified as key chemical at the site. Adjacent OMC site contains PCBs.		
GREAT LAKES WATER QUALITY AGREEMENT OF 1978 (Amended by Protocol)					
	Establishes levels of protectiveness for Great Lakes water quality in executive agreement with Canada.	Not applicable Not appropriate	GLWQA not enforceable under U.S. Law.		

#### TABLE 7

### POTENTIAL ILLINOIS ACTION-SPECIFIC ARARS WCP SITE

11linois Regulations	Requirement	Potential ARAR Status	Analysis
AIR QUALITY			
Ill. Adm. Code, Title 35 Subtitle B, Part 201	Rules governing requirements for air quality including emissions from new sources	Applicable	Remedial action could result in new sources of air emissions. The substantive portion of these regulations may be applicable.
WASTEWATER TREATMENT AND DISPOSAL			
IAC Title 35 Subtitle C Chapter 1	Water quality standards. Designates stream classifications, monitoring and reporting requirements, POTW Regulations, NPDES Permits	Applicable	Remedial actions may discharge to Lake Michigan. Protection of designated use may be an applicable requirement.
IAC Title 35 Subtitle Chapter 1 Part 310	Effluent and pretreatment standards. Prohibits discharges without an NPDES permit. Sets effluent limitations, reporting requirements, pretreatment rules.	Potentially applicable.	Remedial action may discharge to Lake Michigan or POTW. The substantive portion of these regulations may be applicable.
LEAKING UNDERGROUND STORAGE TANKS			
IEPA Leaching Underground Storage Tank Manual, IEPA/LPC/91-203 (Referencing 35 IAC 731)	Generic cleanup objectives for soil and groundwater for sites with releases of light, middle and heavy end petroleum products from underground storage tanks.	Not Applicable	No underground storage tanks reported or identified at site.
HAZARDOUS WASTE			
IAC Title 35 Subtitle G Chapter 1 Subchapter A	General hazardous waste rules: scope of title; definitions; forms; rules of practice. Ill. RCRA rules.	Applicable	Applicable to treatment of residues or wastes taken offsite.

### POTENTIAL ILLINOIS ACTION-SPECIFIC ARARS WCP SITE

Illinois Regulations	Requirement	Potential ARAR Status	Analysis
Subchapter B Parts 702 et. eg.	Permitting	Portions potentially applicable. Potentially relevant and appropriate.	Some actions may result in off- site treatment. Others may result in leaving waste in place.
Subchapter C Parts 720-729	Hazardous waste rules. Waste management system; standards for generators, transporters, and owners and operators of treatment, storage, and disposal facilities; notification requirements.	Portions potentially applicable. Potentially relevant and appropriate.	Some actions may result in off- site treatment. Others may result in leaving waste in place.
Subchapter D	Underground Injection Control and Underground Storage	Portions potentially applicable. Potentially relevant.	Some actions could involve injection; actions do not anticipate underground storage.

# TABLE 8 PRELIMINARY REMEDIATION GOALS NEAR - SURFACE SOILS

SITE: Waukegan Manufactured Gas and Coke Plant Site
RISK-SPECIFIC TARGET CONCENTRATION
RISK EVALUATED: EXCESS LIFETIME CANCER RISK/NONCANCER RISK
EXPOSURE MEDIA: SOIL

ROUTE OF EXPOSURE: INGESTION

Chemical	Weight of Evidence	Slope Factor (mg/kg-day)-1	Source	RfD mg/kg-day	Source	Carcinogen Conc. mg/kg	Tox. Conc. mg/kg
Arsenic		1.750E+00	IRIS	0.0003	IRIS	838.6	1.6E+03
Cadmium				0.0005	IRIS		2.6E+03
Cyanide				0.02	IRIS		1.0E+05
Selenium				0.005	IRIS		2.6E+04
Ethylbenzene				0.1	IRIS		5.2E+05
Toluene				0.2	IRIS		1.0E+06
Xylene				2	IRIS		1.0E+07
Acenaphthene				0.06	IRIS		3.1E+05
Anthracene				0.3	IRIS		1.6E+06
Fluorene				0.04	IRIS		2.1E+05
Fluoranthene				0.04	IRIS		2.1E+05
Naphthalene				0.004	IRIS		2.1E+04
Pyrene				0.03	IRIS		1.6E+05
Phenol				0.6	IRIS		3.1E+06
Benzene	A	0.029	IRIS			50603.0	5.12.00
Benzo[a]anthracene	B2	0.58	IRIS			2530.2	
Benzo[a]pyrene	B2	5.8	IRIS			253.0	
Benzo[b]fluoranthene	B2	0.58	IRIS			2530.2	
Benzo[k]fluoranthene	B2	0.58	IRIS			2530.2	
Chrysene	B2	0.058	IRIS			25301.5	
Dibenzo(a,h)anthrancene	B2	5.8	IRIS			253.0	
Indexo[1,2,3-cd]pyrene	B2	0.58	IRIS			2530.2	
EXPOSURE ASSUMPTIONS		Units	Data				
Target Risk	1E-04	unitless	input				
IR-Ingestion rate	50	mg/day	• input				
BW-Body weight	70	kg	input				
EF-Exposure frequency	250	days/yr	input				
CC-Climate correction	0.39	%	input				
ED-Exposure duration	25	yr	input				
AT-Averaging time-cancer	70	yr	input				
AT-Averaging time-noncancer	25	yr	calc				
CF-Conversion factor	1E-06	kg/mg	fixed				

#### TABLE 8 (continued)

#### PRELIMINARY REMEDIATION GOALS

#### **NEAR - SURFACE SOILS**

SITE: Waukegan Manufactured Gas and Coke Plant Site

RISK-SPECIFIC TARGET CONCENTRATION

RISK EVALUATED: EXCESS LIFETIME CANCER RISK/NONCANCER RISK

EXPOSURE MEDIA: SOIL

ROUTE OF EXPOSURE: INGESTION

Chemical	Weight of Evidence	Slope Factor (mg/kg-day)-1	Source	RfD mg/kg-day	Source	Carcinogen Conc. mg/kg	Tox. Conc. mg/kg
Arsenic	A	1.750E+00	IRIS	0.0003	IRIS	8.4	1.6E+03
Cadmium				0.0005	IRIS		2.6E+03
Cyanide				0.02	IRIS		1.0E+05
Selenium				0.005	IRIS		2.6E+04
Ethylbenzene				0.1	IRIS		5.2E+05
Toluene				0.2	IRIS		1.0E+06
Xylene				2	IRIS		1.0E+07
Acenaphthene				0.06	IRIS		3.1E+05
Anthracene				0.3	IRIS		1.6E+06
Fluorene				0.04	IRIS		2.1E+05
Fluoranthene				0.04	IRIS		2.1E+05
Naphthalene				0.004	IRIS		2.1E+04
Pyrene				0.03	IRIS		1.6E+05
Phenol				0.6	IRIS		3.1E+06
Benzene	A	0.029	IRIS			506.0	
Benzo[a]anthracene	B2	0.58	IRIS			25.3	
Benzo[a]pyrene	B2	5.8	IRIS			2.5	
Benzo[b]fluoranthene	B2	0.58	IRIS			25.3	
Benzo(k)fluoranthene	B2	0.58	IRIS			25.3	
Chrysene	B2	0.058	IRIS			253.0	
Dibenzo[a,h]anthrancene	B2	5.8	IRIS			2.5	
Indeno[1,2,3-cd]pyrene	B2	0.58	IRIS			25.3	
EXPOSURE ASSUMPTIONS	•	Units	Data				
Farget Risk	1E-06	unitless	input				
R-Ingestion rate	50	mg/day	input				
BW-Body weight	70	kg	input				
EF-Exposure frequency	250	days/yr	input				
CC-Climate correction	0.39	%	input				
ED-Exposure duration	25	yr	input				
AT-Averaging time-cancer	70	yr	input				
AT-Averaging time-noncancer	25	yr	calc				
CF-Conversion factor	1E-06	kg/mg	fixed				